Faculty of Design

2013

From product to service design: A thinking paradigm shift

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SYSTEMIC DESIGN - EMERGING CONTEXTS FOR SYSTEMS PERSPECTIVES IN DESIGN

AHO – OSLO SCHOOL OF ARCHITECTURE & DESIGN - OSLO, NORWAY - 9TH-11TH OCTOBER 2013

FROM PRODUCT TO SERVICE DESIGN: A THINKING PARADIGM SHIFT

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ABSTRACT

Motivation

The economy, society and industry are experiencing change by a shift from products to services. It is apparent that this also brings an on-going 'conceptual shift' in business and industry characterised by a movement from traditional goods-centred dominant logic to emerging service-centred dominant logic.

While a "problem solving" approach is commonly used for the development of products, as the primary unit of exchange moving from goods to service, new design approaches for the development of services are needed. The diverse nature of services in comparison to products, where service are specialised competences such as knowledge and skills that people can acquire and exchange, highlight the need for new design approaches. This research argues that a fundamental transformation in the design world is taking place, manifested in a thinking paradigm shift from problem solving (designing products) towards system thinking (designing services).

Furthermore, the very own nature of products has also changed. From being purely physical and tangible entities, they are becoming mixed entities, with both physical and virtual (or intangible) attributes. Also, from being individual objects that stand alone, products now are part of complex systems, becoming the touch points (TP) of a service. The touch points include interactive properties that allow people that use them (users) to exchange information in and out, acting as enablers in the communication between the service providers and users.

These changes have direct implications in the activity of designers, and in the way designers approach problems and issues.

Problem Statement

This paper intends to help understanding how the design activity has change from problem solving to system thinking. This paper seeks to demonstrate that the design of services requires system thinking, and that using system thinking can be a more suitable approach to the development of services than problem solving.

Approach

This paper will draw on relevant design literature to identify the concepts of system thinking and problem solving within the context of design, to help understanding core elements in the shift from product to service design.

This paper will also be based on a series of semi structured interviews made to designers actively working on design, which have moved from product design towards services design. It will explain their account on how this change has taken place, and on how they have evolved to adopt different design methods and approaches as a response to the new challenges of designing services. It will conclude on the interviewees' perceptions on how (or if) their way of think about design challenges has changed.

Main findings

The results of this research show that a change in the way designers think and approach projects has taken place. This change confirms a movement from problem solving to system thinking, when designers are faced with the challenges of designing a service. However system thinking is not necessarily replacing problem solving system but complementing it.

The results also indicate that the growing complexity of the issues designers deals with have an influence on the adoption of system thinking to respond to service design challenges. It also shows that current changes in people's mind about sustainability, society, etc. have also an impact on this.

Conclusions

This paper shows that the design of products requires a different design approach to the design of services, and that there is a strong link between system thinking and the design of services. However it cannot claim generalisation and can be taken only as an initial exploration on the subject. Further study would be needed to establish correlation between the design of services and system thinking approaches, and to examine the role of other alternative design approaches employed in services design. Although most of the designers included in this study are UK based, 2 of them are base in the

Netherlands and in Australia. The variety on their accounts suggests that further investigation with a broader range of designers based abroad, might allow a better understanding of the subject.
Keywords: Service design, product design, system thinking, paradigm shift, innovation

INTRODUCTION

The economy, society and industry are experiencing a shift from products to services. As a result of this there is an on-going 'conceptual shift' in business and industry characterised by a movement from traditional goods-centred dominant logic (GDL) to emerging service-centred dominant logic (SDL) (Vargo & Lush [2008]).

While a "problem solving" approach is commonly used in the design of products (Cross [1990]; Taura & Nagai [2011]; Rogers et al. [2005]; Dorst & Dijkhuis [2005]) the primary unit of exchange is moving from goods to services (Vargo & Lush [2008]), evidencing that new design approaches for the development of services are needed. This need becomes even more critical as on the one hand, the very nature of products that might be related to services has changed, from being purely physical and tangible entities, to become mixed entities, with both physical and virtual (or intangible) attributes (Rodriguez [2010]). On the other hand, goods are being absorbed or replaced by services, and the later are now considered as specialised competences such as knowledge and skills that people can acquire and exchange (Vargo & Lush [2008]).

These changes have direct implications for the activity of designers, and in the way designers approach problems and issues. From a product centred design activity, designers are moving to a product-service or service centred design activity. As Young [2008] explains, "The shift in focus from product- and artefact-centred design theory to system- and service-oriented thinking has followed the advent and growth of services in our economy and society accompanied by corresponding changes in technology" (p. 43).

This research seeks to understand if a fundamental transformation in the design world is taking place, manifested in a thinking paradigm shift from problem solving (designing products) towards system thinking (designing services). Having in mind that the issues designers face while designing services appears increasingly complex, systems thinking would appear as the most appropriate and prevalent approach. As Hugentobler et al. [2004] argue while discussing the implications of system thinking as an answer to complexity as a problem, "If we really want to support the shift from designers as executants to designers as executives, who originate ideas and plan processes to put these ideas into practice, then systems thinking has to be considered an essential part of this programme."

APPROACH AND METHODOLOGY

To address the research theme, a review of the relevant design literature has been undertaken in order to identify the main relevant concepts: Problem solving and system thinking. This has been embedded in a narrative that describes the transition from product design to service design in current design practice, articulating the adoption of system thinking by service designers as a response to the increasing complexity of services. The literature review has covered the areas of design (product design and design thinking in particular), service design (mostly from the design point of view and occasionally from the management perspective), system thinking and complexity. The narrative has been developed over 5 main headings:

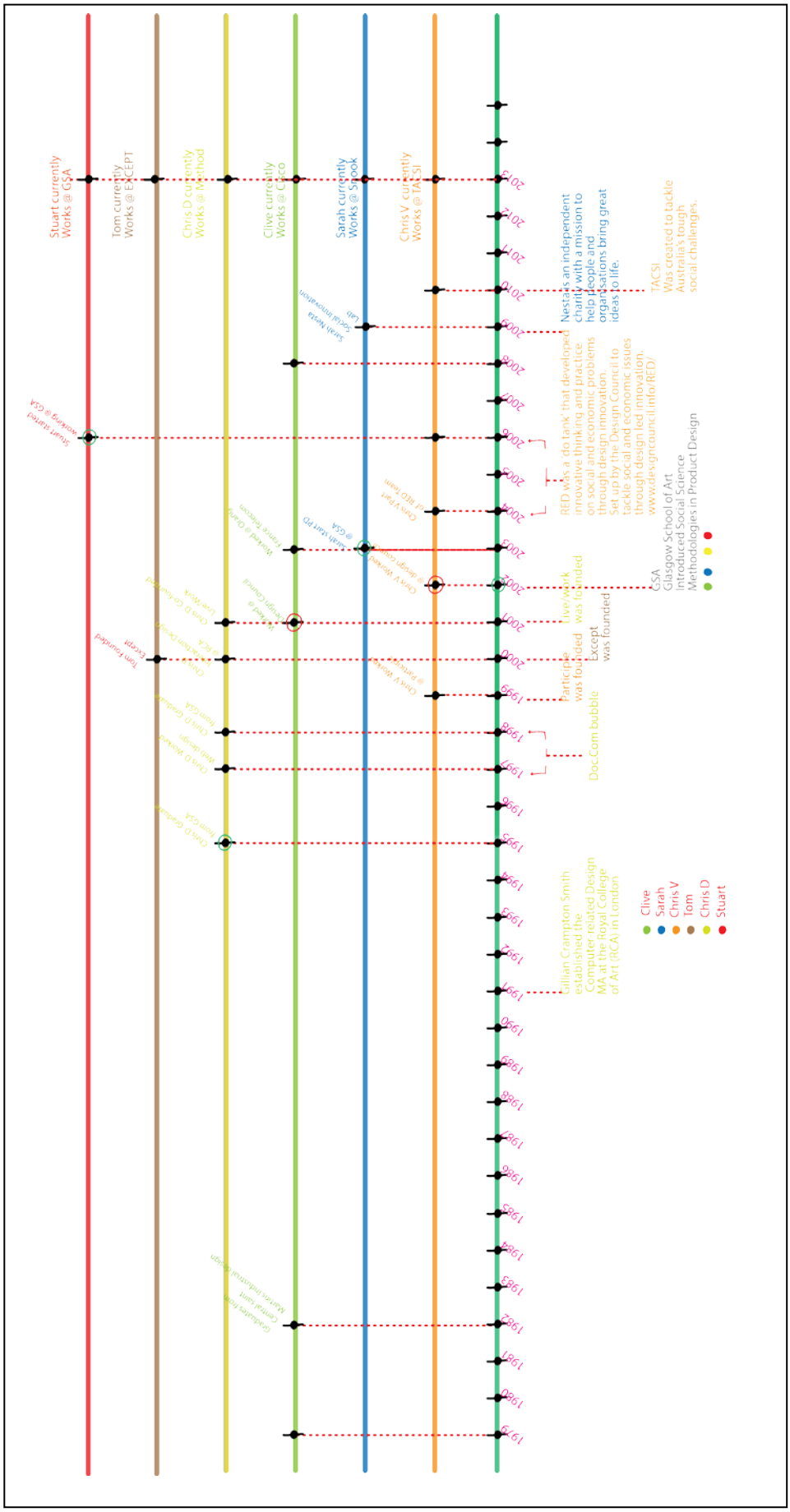
-Moving away from problem solving in product design
-The shift from product to service design
-Services as complex systems
-Designers dealing with services as designers dealing with systems
-System thinking in the design of services

Further than providing a theoretical framework for this study, the literature review has been conducted to contextualise a series of one hour semi structured interviews that were conducted with designers that have moved from product design towards services design.

The chosen designers have been protagonists in the shift from product to service design, mainly in the UK. Table 1 shows primary information about the interviewees. Diagram 1 presents a timeline illustrating some of the interviewees' relevant landmarks within the context of product and services design, during the last 20 years.

Lecturer/ Product Design & PD Eng	UK	THE GLASGOW SCHOOL OF ART
Founder/Director	Netherlands	EXCEPT INTEGRATED SUSTAINABILITY
Co-founder	UK	livelwork
Director, User Experience	UK	cisco
Co-founder and Director of Design	UK	SNOOK transforming people
Director, Co-design	Australia	BOLD IDEAS. BETTER LIVES. THE AUSTRALIAN CENTRE FOR SOCIAL INNOVATION

Table 1


Stuart currently Works @ CSA
Tom currently Works @ EXCEPT
Chris D currently Works @ Method
Clive currently Works @ Cocco
Sarah currently Works @ Spook
Chris V currently Works @ TACSI
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Nesta is an independent charity with a mission to help people and organisations bring great ideas to life.
TACSI Was created to tackle Australias tough social challenges.
RED was a 'do tank' that developed innovative thinking and practice on social and economic problems through design innovation. Set up by the Design Council to tackle social and economic issues through design led innovation. www.designcouncil.info/RED/
CSA Glasgow School of Art Introduced Social Science Methodologies in Product Design
Live/work was founded
Except was founded
Participle was founded
Doc.Com bubble
Gillian Crampton Smith established the Computer-related Design MA at the Royal College of Art (RCA) in London
Clive
Sarah
Chris V
Tom
Chris D
Stuart

Diagram 1

The interviews aimed to elicit interviewees' perceptions of:

-Concepts: In order to gain understanding on the interviewees' perceptions about the relevant concepts by which they might articulate their views. (On products, services, service design)

-The shift: With the purpose of understanding interviewees' view of the shift from product design to service design (Drivers, Development, influences)

-Design thinking/approach: To elicit interviewees' perceptions about the potential changes in their design thinking and approach, particularly in relation to problem solving and system thinking. (In the context of the shift from designing products to designing services)

To achieve this, the interview questions were divided into five main themes with normally two questions each. Interviewees were asked to answer each question, and on occasions to draw or write some of their ideas (to facilitate in eliciting their thoughts).

The themes and questions were as follows:

Theme 1 Product vs. services

-What is the difference between a product and a service?

-How different is to design a product than a service?

Theme 2 Design of Services

-When did you start to design services and why? (What was the first service design project you did?)

-What design skills have you developed to design services?

Theme 3 Shift from products to services

-There has been a shift from product to services design. What has influenced this shift?

-How the professional practice has changed with the design of services? (Has the nature of your work changed?)

Theme 4 Problem solving approach and system thinking

-Would you be able to write 5 words to explain your design thinking when designing products and when designing services? You have minute for each

-Problem solving thinking is a fundamental skill for the design of products. Do you agree? Elaborate.

-System thinking is a fundamental skill for the design of services. Do you agree? Elaborate.
-How problem solving weights in comparison to system thinking, when designing products and when designing services?

The interviews were conducted personally or via Skype. They were audio recorded and summarised. The audio recordings were played and listened by the researchers several times and notes of key concepts were taken on post-its. These post-its were subsequently organized on a grid, becoming a method of coding. Further discussions took place between the researchers in order to identify and differentiate the range of views on the interview questions. Diagrams and tables helped to synthesise emerging ideas and findings.

The findings of this study have been synthesised following the themed structure of the interview. Each theme corresponds to individual sub-sections. The views of the interviewees have been reported, emphasising on perceived commonalities and differences between the interviewees' responses. At the end of each sub- section a table or a diagram has been included, synthesising emergent ideas.

The discussion section examined the finding and set comparisons with the literature review. By extrapolating theory from the literature, and first-hand information from the interviews, an attempt has been made to offer a synthetic view of the extent by which a shift in design thinking has taken place in the transition from product to design services, moving from a product solving to a system thinking approach.

The validity of this research is limited as its finding are based on the subjective perceptions of the researcher about the phenomena studied, as well as the views collected from the people interviewed. Equally it has reliability limitations (generalisation) as the number of people interview does not constitute a representative sample of the population involved in the matters of this study.

The claims of this study are moderate generalisations and do not attempt to offer a comprehensive and ultimate explanation of the phenomena studied. However, an endeavour has been made to offer some initial grounds to underpin further and more conclusive research on the subject of the shift from problem solving to system thinking in services design.

Moving away from problem solving in product design

Problem solving is regarded as a main driver for design activity (Lawson & Dorst [2009]). Designers tend to develop products to answer to phenomena framed as "problems". This way of dealing with a world they are supposed to modify and improve, gives designers the means to focus their activity towards and end. Also, it provides a pattern to measure the success of their design proposals against, since "problems solved" can often be seen as an indicator of "good design solutions".

In addition, the problem solving approach can also define the design process in full. Johansson-Skoldberg et al [2013] suggest that the design process is a problem solving activity framed by analytical and synthetical thinking. Johansson-Skoldberg et al relate design activity with a "step –by-step model of the design process with its too distinct phases: an analytical step of *problem definition*, followed by a synthetic sequence of *problem solution*". As the problem solving approach helps designers to focus, to measure the success of their creations and to undertake design activity following a suited design process, it seems to be sufficient as an overarching principle for product design activity.

However the problem solving approach seems to be associated with a model of design that might be becoming obsolete. On the one hand this approach seems to, as suggested by Jonas [1996], be based on the assumption that problems can be well defined and solved if this is based on a good knowledge of people's needs and desires, and that it assumes the designer's ability to know what is "good for people". This renders design as an activity almost exclusively driven by the designers' own understanding of the issues they are dealing with. However, as user involvement is increasingly becoming a standard practice in design through participatory design methods, the problem solving approach model coming from the "design methods movement" underpinned on cybernetic thinking from the 60's and 70's (Jonas [1996]), seems to be at odds with the idea of a design process in which users take an active part on the formulation and resolution of issues through design.

Conversely, as social change and technological developments mean that society is becoming more interconnected, and new ways of interaction and organisation lead to new experiences and ways of being, so the nature of the issues that designers deal with are changing, as is the way in which designers deal with them. Jonas explains how a problem solving approach is becoming less central in design, as designers have to deal with issues that are complex, fuzzy, non-predictable and pluralistic

in values. He describes them as “ill-defined” problems, arguing for the need of design tools for “the description and analysis of complex problem fields “.

The shift from product to service design

While dealing with increasingly complex issues, product designers have expanded the scope of their activities beyond the design of objects within their “traditional” boundaries of form, function, material and production (Miettinen [2011] p.65), moving into the realm of interactions, systems and environments. Consequently, the conception of product amongst product designers has departed from its material existence, becoming activities, services, and policies (Buchanan [2001]).

This expansion in the activity and scope of product designers, framed in the economy and industry shift from GDL to SDL, has enabled them to move into the design of services. Additionally, specific product design perspectives such as “a user centred design approach, a variety of qualitative and quantitative research and data gathering approaches, and visualisation techniques such as sketching, imagining and prototyping” (Miettinen [2011] p.65), has allowed product designers to champion the development of service design as a new design discipline heavily underpinned by research and user involvement. For example, this can be noticed in the UK, in the creation of pioneering services design consultancies by product designers such as Live Work (2001), or Engine (2000), or by innovative curricular shifts in product design courses towards the design of services as took place at the Glasgow School of Art (2005). In this context, service design can be thought as an enquiry rather than a problem-solving activity, situated in the realm of non-engineering design and is based on the conception of services as the basic unit of economic exchange instead of something distinct from goods (Kimbell [2001]). Diagram 2 shows Kimbell’s graphic synthesis of this concept.

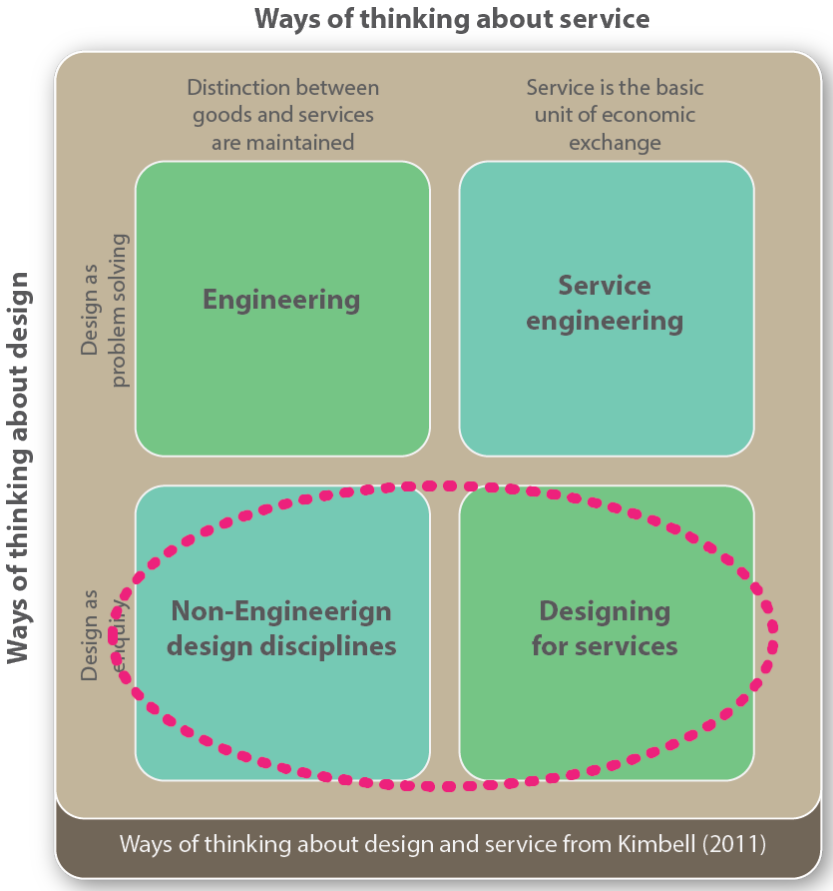

Diagram 2 (Redrawn from Kimbell [2011])

Services as complex systems

Services often involve complex interactions between users, service providers and other stakeholders. Furthermore, they mediate the exchange of information and goods between people. Services are regarded as "complex and multifaceted phenomena" that comprise interrelated aspects as diverse as: Environment, domain, activities, tools and artefacts, goals, agents, collaborations and group value(s) and Effectiveness" (Wild [2009]).

Making such reference to the complexity of services, Polaine et al. [2013] justifies the use of the 'ecologies metaphor' used to describe how services often "harbour a complexity that can be compared to systems in nature" (p.81). As systems, services can 'interact' with other services creating networks of services, becoming service systems. Also, as the provision of services from companies and organisations are often interlaced with the provision of products, they become product service systems (PSS) (Morelli [2006]).

Designers dealing with services as designers dealing with systems

It seems that while designing services, designers need to deal with the "complexity and multiple stakeholders that are inherent in services" (Polaine et al. [2013] p.187) and with 'systems' that "present a different type of complexity than industrial products" (p. 85). Clathworthy [2011] identifies services as systems in which "customers and services interact through many different touch points during the customer journey" (p.80). Following this, as services can be considered as complex dynamic systems, it seems natural that there is a need for designers to use a systemic approach when facing the challenges of designing a service. Making allusion to the services dynamic nature, Clathworthy [2011] argues that "services require us to design systems that adapt well to constantly changing parts" (p.85).

From a different perspective, Love [2003] problematises the "uncritical conflation of the activities of designing and systems analysis" as it can create confusion in the theoretical development of both fields, as well as leading to the hampering of design and system analysis processes and outcomes. In contrast to the system thinking approach, Love suggests that the problem solving approach provides "information that designers and design stakeholders can draw on to make better judgments about the compositional issues that are central to the core activity of designing". Yet, Love recognises that designers use "system methods and perspectives" as sophisticated tools for gathering information. However, using "system methods and perspectives" only for gathering information seems to be insufficient to help understanding the complex and fuzzy issues designers might be trying to address, and to unravel possible undetected areas with potential and relevance for design intervention. The scope of system thinking can be wider, and encompass critical analytical, synthetical and creative aspects of the design of services. As Nielsen & Nielsen [2009] explains, "Having detailed knowledge about the service as a system opens up for experimentation with new innovations around how the service can be designed."

System thinking in the design of services

As services can be thought of as systems, and designing systems of services might offer scope for a service designer, the adoption of system thinking seems to become essential for the practice of service design. Thus several authors recognise the importance of system thinking in services design. For example, while Gloppen [2009] *describes* system thinking as a research area to "further develop the service design leadership role" (p.89), Kwon & van Boeijen [20012] see system thinking as one of the three service design focuses alongside with experience and time based medium.

As the service design discipline emerges, networks of services grow and evolve, generating newer and wider networks of interdependent systems. Within these systems and their complexity lay the design challenges for service designers. On this regards Polaine et al. [2013] explain, “These systems present a different type of complexity than industrial products. Products require designers to deal with many moving parts, but services require us to design systems that adapt well to constantly changing parts. Networks, organizations, and technology evolve on a daily basis, but the service still needs to deliver a robust customer experience.” (p. 85)

Consequently, it is not surprising that system thinking has been adopted by service designers as the Design Council’s RED paper 2 reports “A number of design groups have broadened the scope of design to include disciplines such as interaction, experience and service design. All of these demand a holistic approach, a level of systems thinking, a focus on individual behaviour, and the orchestration of a range of different design inputs” Burns et al. [2006]

A view of system thinking with characteristics that seems to be coherent with fundamental aspects of service design, and that opens up the posibility of using it beyond Love’s concept of “gathering information” is that of Nelson & Stolterman [2012]. Introduced in their book “The design Way”, they outlined a list of elements that characterise the system approach, which coincides with the hollistic, dinamic and complex nature of designing services (p.60):

Systems approach

- Interrelationships/compositions
- Interconnections/emergence
- Inclusive, unifying, and integrating
- Holistic inquiry
- Observer dependent
- Multidimensional
- Mutual:
    - Analytic and synthetic
    - Left and right brain
    - Rational and aesthetic
    - Objective and subjective
    - Individual and unified
    - Complex and simple
    - Similar and different

- Thinking and acting
- Big picture and details

Nelson & Stolterman argue the existence of two distinctive scholarly discourses around the idea of systems. They identifies systems from an epistemological stance when is an "embodied way of thinking" or from an ontological stance when system is "the thing that is thought about". The ontological stance refers to the "understanding of systems as "real things"" and is located within the confines of system science and the scientific method. The epistemological refers to a "systemic inquiry approach", which focuses on a way of thinking that enables different fields of focused enquiry to be related to each other". These authors emphasise the idea that system thinking is "a *stance* that can be assumed by a change in *mindset"*, one which relies less on the "mastery of a set of theories, methods, and facts" (p. 64).

This study takes the view of system thinking as a way of thinking and understanding phenomena and embraces Nelson & Stolterman's elements of a system approach. Their system thinking approach can help to understand relational aspects of otherwise fuzzy and complex issues, and become an instrument of analysis and synthesis. Rather than a collection of science-based methods, system thinking should be read in this study as a world view that sees things as being holistic and interconnected Maani & Maharaj [2001).

FINDINGS

The interviews were structured according to the main themes of the research, in order to gain understanding on the interviewees perceptions of the differences between products and services; on what the design of services entails; on how their shift from product to service design developed; and their views about their change of thinking in regards to problem solving and system thinking.

Theme 1 Product and services

-What is the difference between a product and a service?

The views on the differences between product and services amongst services designers are noticeable and not homogeneous.

One of the interviewees believes that products and services relate functionally to each other, as products can deliver services and services are “ecosystems” that can contains products.

Two other interviewees see the difference in terms of interaction. They explain that while a product involve a single interaction, a service is made of multiple and different interactions over time.

One interviewed declares that the nature of products is static (as they remains unchanged once they have been designed) and the nature of a service is dynamic: They have an “on-going” and flexible character. He highlights the wider scope of services, which includes for example people’s role.

Other interviewed made reference at the physical character of products as opposed at the intangible character of services. This interviewed highlights the commonality of product and services as they are both the mean by which design solves problems.

One other interviewed emphasises the academic character of any differentiation between products and services, arguing that this is not relevant for users.

From the interviewees answers six criteria to establish differences between products and services emerged:

-Complexity and number of interactions
-Static-Dynamic character
-Scope
-Tangibility
-Relationship with problems
-Relevance of differentiation

According to these criteria, perceived differences between products and services are outlined in table 2.

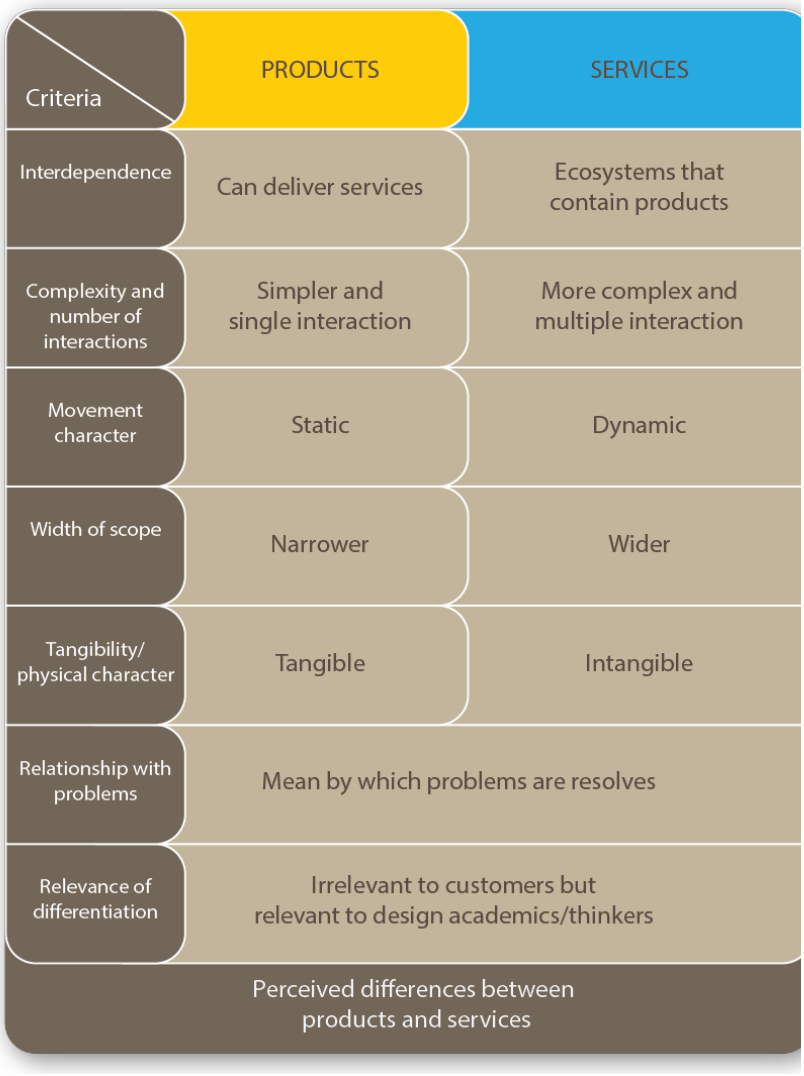

Table 2

-How different is to design a product than a service?

Services designers seem to agreed that the process for the design of services and for the design of products is similar at a high level. However they find some differences at lower levels.

For example one of the interviewees declares that while the process is the same, different “craft” and “techniques” are employed for the design of services and products. This difference relates to the “manufactured” character of products and to the relationship of services with “organizational change” and “back-end systems”.

Another interviewee emphasises on the scale of products and services as a factor affecting their design process. She suggests that the design process for services is more complex as services are "bigger" and more complex than objects.

One of the interviewees suggests that there is a substantial difference between the development of prototypes while designing products and services. In the first instance, the prototypes are representation of the final product made through models, renderings and mock-ups amongst others. In the second instance, prototypes are the realisation of the entire service, only at a smaller scale in regards to its duration and coverage (number of stake holders). Actually, it is a fully functional scaled down version of the service (a pilot) rather than a representation of it.

Other interviewee seems to imply that there is only one design process, This process helps to understand the context in such a way that a decision can be made on whether a product or a service is the best medium to deliver a design solution.

Another interviewee argues that the design process is affected by the nature of services and products in regards to their complexity and constrains. He explains how products have limited features and functions, and therefore the process to design those deals only with a defined set of constrains. In contrast, Services are complex in nature and ask the design process for a broader set of deliverables. He says "the more you work on it, the more you uncover".

Yet, there seems to be a one single difference at a higher level in the process of designing products and services in the form of an additional step towards the end of the process. For products, the design process finishes with the final specification for production. For services it goes beyond the specification of the service, including the implementation of it, and in some cases, the initial running of the service.

To summarise, differences between designing a product and a service were related to five main areas: First, in relation to the craft and techniques employed, second in reference to their perceived complexity. Third in regards to the type of prototypes employed, fourth concerning to the project constrains and breadth of expected deliverables and fifth in connection to their process length, number of steps and end point. Table 3 illustrates the perceived differences between designing a product and designing a service.

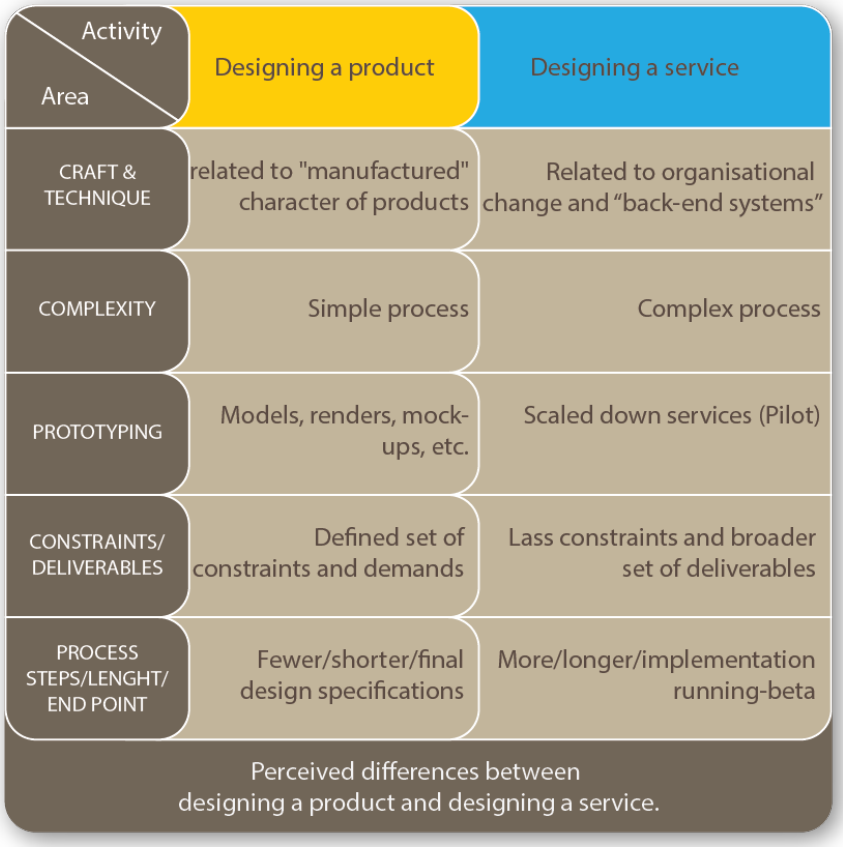

Table 3

Theme 2 Design of Services

When did you start to design services and why? (What was the first service design project you did?)

It seems that services designers' transition from product design to services design occurred gradually and started with the realisation of the importance of user experience and user centred design.

One interviewee informed that his first contact with services design occurred during one of his projects when studying product design. He realised that a very important part of the product he was designing, was to offer to its user a good experience. His first professional services design project was at Cisco. It was related to data storage, and he integrated work carried out by developers with the insights of users.

Another interviewee was also exposed to services design for the first time during her product design course at the Glasgow School of Art. While developing a project of a lamp shade, she went beyond it by setting a website to allow customers personalising their products. Later she got involved in services design through a social innovation lab organised by Nesta and from there she sat up a design services consultancy.

One of the interviewees started his first service related design activities while working for the Red group at the design council, exploring new interactions for voting, citizenship ceremonies, etc. This made him realise the importance of experiences and behaviours in design. He then specialised in services design projects working in the design consultancy Participle, and later in social innovation design at Tacsi in Australia.

Another interviewee with educational background in product design and interaction design got involved in the design of services from his professional activity designing web pages. His first design services project was about data management. He then co-found Livework, for many considered the first services design consultancy.

It is noticeable that all of these designers have moved from product design to services design, but none of them have returned to product. Instead they have moved to other areas such as experience design or social innovation design.

Four main reasons explain why the interviewed product designers moved into services design. First, the nature of their design approach “naturally” led them to the development of services rather than products as a design output. Second the government agenda seem to stimulate design work in the area of services. Third the transferability of their product design tools to approach service design challenges enables them to make a swift transition and fifth, the development of new professional design areas stimulated the shift. Table 4 summarises these reasons.

DESIGNERS APPROACH	Focus on experience
	Understanding the importance of user insights
	Seeking to improve products by enabling user involvement in service-like systems
GOVERNMENT AGENDA	Increasing interest of government in developing innovative ways of approaching social issues
	Increasing interest of government in improving processes of civil participation (Voting, Citizenship ceremonies, etc.)
TRANSFERABLE DESIGN TOOLS	Transferability of design methods from design consultancy to other contexts such as government, organizations and charities.
DEVELOPMENT OF NEW PROFESSIONAL AREAS	Development and crossover of other design fields such as web development and interaction design.

Product designers' reasons for moving into service design

Table 4

What design skills have you developed to design services?

As service designers the interviewees felt they have developed a wide set of skills. These skills have been grouped in 10 different categories: Attitude, Interpersonal, Research, Communication, Participatory Design, Aesthetics, Business, Thinking, Knowledge and Interdisciplinary.

It is noticeable that system thinking has only been named by one of the designers, while those skill related to business have been mentioned by three of them. The categories of research, communication and thinking are the ones that have more items, suggesting some emerging areas of skilling in the shift from product to services design. Table 5 shows the skills developed according to the interviewees account.

	CG	SD	CV	TR	CD
Attitude	Naive view				
	Empathy				
Interpersonal		Confidence to deal with others			Empathy
			Enable conversation		
Research	Questioning				
			User research skills		
			Ethnography		Ethnography
					Being able to interpret custoemrs
Communication	Drawing	Visual comm.unication			
	Scenario building				
	Story telling				
	Quick prototyping		Service prototyping		
Participatory Design		Co-creation abilty	Co-design		
			Face to face design		
Aesthetics	Sense of making things beautiful				
Business			Business modelling/ innovation	Businees planning and management	Business
Thinking		Deal with complexity		Complex thinking thinking	
				System thinking	
				System mapping	
				Value flows	
				Understanding patterns	
			Segmentation		
			Analytical skills		
Knowledge			Programme theory and logic		
				Sociology	
					Interaction
					Project management
Interdisciplinary					Interdisciplinary

Skills developed for service design

Table 5

Theme 3 Shift from products to services

There has been a shift from product to services design. What has influenced this shift?

It seems that a diverse collection of factors have influenced the shift from product to services design: First, an increasing general awareness and concern amongst designers (and the general public) about environmental issues. For example one of the interviewees says that environmental concerns are moving designers to think that creating fewer objects is a positive action. He also says that as objects become multifunctional, they become "dumb" as they are difficult to use and most of their functions turn redundant, and easily replaceable in a service environment. As function is delivered mostly through an immaterial entity (the service), services seems a more sustainable (and designerly) option to physical products. He also mentions that this sometimes is not supported outside design, and that for example some politicians in the UK still support the development of products over services, on the hope of generating more employment in the manufacturing sector.

Second, the worldwide expansion of the internet and the development of interactive technology have also played a fundamental influence on the shift. One of the interviewees explains it by saying that being digital enable multimodal experiences, and that this enable designers to develop services that improve user journeys. Networking technologies and the internet are also identified by other interviewee as accelerators and amplifiers of the services phenomena.

A third aspect, relates to an on-going trend in social and government environments towards user and citizen centeredness. As highlighted by another interviewee, this implies the need of a service design thinking rather than a product design thinking, as "face to face" design interventions (co-design, user conversations, etc.) typical of service design practice are required. He also highlights that services as opposed to products, are a better platform for inducing behavioural change, for looking for new innovation methodologies, new business models in public services, and to tackle social challenges as youth disengagement or child protection issues. While he recognises the potential of services design to bring tools to addressing these challenges, he also advices on the need of a rigorous approach that involves other disciplines such as business or social sciences, in order to achieve real innovation. Otherwise he says, "...if we keep doing the same thing, we will keep at getting what we always got."

One last aspect that is affecting the shift, relates to the starts-up phenomena. One of the interviewees argues that this embodies the transition from product to services, as they enable the

design and development of new services business models. The interviewee comments that this might be a negative development for established services design consultancies, as the start-up model makes the need of a service designer irrelevant. This becomes even more critical, as current services design consultancies have relied too much on public funding for their work (as they mostly works for public organisations), and have developed less expertise in working with business and the private sector (at least in the UK).

Diagram 3 shows a summary of factor influencing the shift from product to services design according to the interviewees.

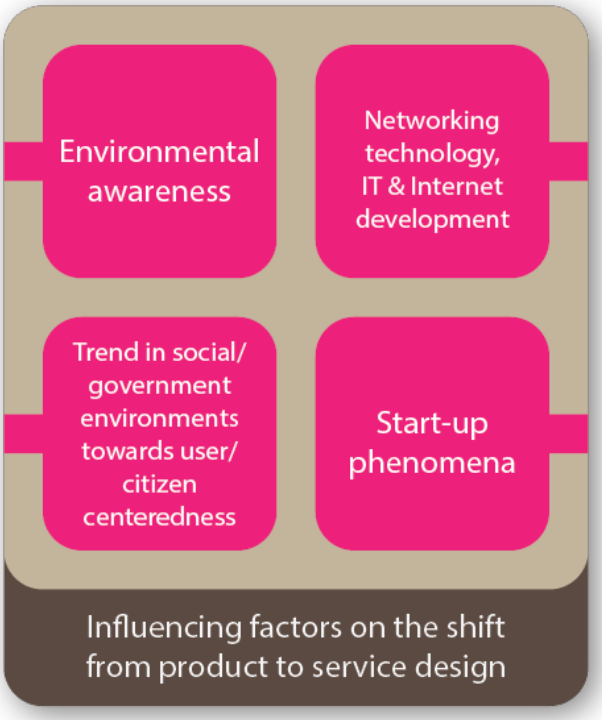

Diagram 3

How the professional practice has changed with the design of services? (Has the nature of your work changed?)

As one of the interviewees explains, the manufacturing industry has been drying out in the last 30 years and this has made product designers to refocus their professional practice towards the design of services. Initially, they concentrated in working for the public sector and government, as their agenda focused in behavioural change and having people needs driving their activity and policies.

With the financial crisis, public funding for pursuing this agenda became less abundant and a new shift towards the financial, insurance and banking services occurred. (Consultancies like IDEO exemplify this shift).

In this context, there have been noticeable changes in the practice of design. For example, services designers need to invest time and energy justifying their research methods (As that often requires investing more time and money than clients would expect). As one of the interviewees explains, this might be necessary as some of the research methods used by designers are perceived by their clients as something they have already done.

One aspect raised by several interviewees, highlights the increase focus of design activity on understanding people, their needs and behaviours, as the expected design output is often a user behavioural change. However, as another interviewee explains, designers need also to focus their activity beyond customer experience improvement towards the design of the business model.

Another important change relates to the disciplinary identity of the designers. Services design projects often implies team working with people from a wide range of disciplines, and with different project stakeholders. The activity of these teams, as highlighted by one of the interviewees, is centred on the purpose rather than the participants' skills. Therefore, designers ought to "care" less about their discipline, and be more ready to embrace other people's approaches. One of the interviewees illustrates this by explaining how in the interdisciplinary project sessions he holds in his services practice, he asks colleagues to "leave their profession" outside the meeting room, and come in not as designer, or architect, or whatever profession they have, but as a person.

One last change is expressed by one of the interviewees as the need for designers to be more responsible. This refers to the idea that the design of a service does not end on the approval of a final concept (as it could well happen in a product design project). Instead, the service design project includes the realisation of prototypes and the implementation of pilots for testing purposes, and can also include the operation and running of the service for an initial period; as this happens, the designers' area of responsibility increases, as well as the provision of their design toolkit.

Diagram 4 illustrates the main changes in professional design practice while doing service design identified by the interviewees.

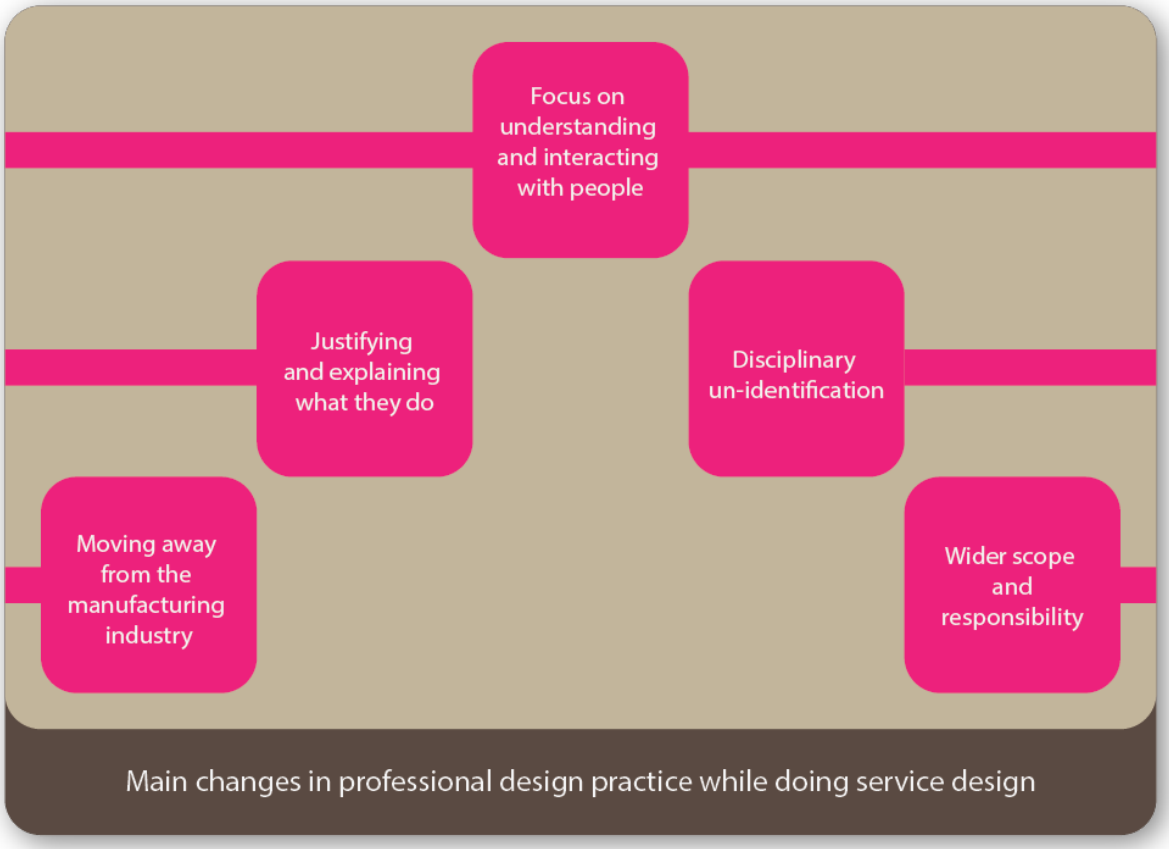

Diagram 4

Theme 4 Problem solving approach and system thinking

Would you be able to write 5 words to explain your design thinking when designing products and when designing services?

The interviewees were able to identify a wide range of words to describe their thinking while designing products and services. Even though most of them manifested at the beginning of the interview (in theme1) that the design of services was not that different from designing products (at least at a higher levels), the results of this question seems to indicate otherwise. Out of 12 words elicited for product and 10 for service, there was only one in common: User. This leads to think that the user centred approach, common amongst product designers, is transferred to the design of services. It is also noticeable that words that can be directly associated to system thinking such as network, organisation, system, task, outputs and process, were only include as descriptors for the design of services.

Table 6 shows the design thinking concepts elicited by the interviewees. The words on the left column represent categories identified by the researchers of this study.

PRODUCT					
	CG	SD	CV	TR	CD
Funcion	Function				
Aesthetics		Detail	Style		
Interaction	Product		Interactions		
Form	Product		Form		
Object		Object			Artefact
Materiality		Material			Material
Manufacture	Product	Manufacture			
Consumption					Comsumption
User	Product		Market		User needs
Ownership					Ownership
Competition			Competition		

SERVICE					
	CG	SD	CV	TR*	CD
Centre of Activity	Value/proposition				Data
User	Person/Context		Face to face		User Capabil./Access
Network	T-Points/Eco-Systems	Eco-system		Full espectrum	Network
Description	Journey/Design Vision	Umbrella			
Organisation		Organisation			
Business models			Business models	Botton-up/Top down	
Systems	Architecture of delivery	Holistic		Systemic	
Multidisciplinary				Multidisciplinary	
Task/output		Delivery	Change/Roles/Scenes		Contribution
Process				Iterative	

Design thinking concepts in product design and service design

Table 6

Problem solving thinking is a fundamental skill for the design of products. Do you agree? Elaborate.

The interviewees generally agreed on that problem thinking is a fundamental skill for the design of products. However some of them suggested that there are equivalent but more “positive” ways of framing this skill, implying the negative character of the word problem. One interviewee equates problem to opportunity, emphasising the optimist character of the later. Similarly, another interviewee proposes to change problem solving for opportunity grasping.

Some additional observations were made on the usefulness of problem solving. For example, one of the interviewees stated that problem solving approach is useful to integrate designed tangible and

intangible elements. Another highlighted its usefulness if geared towards the building of visions. Other interviewee made distinction between design task focused towards the alteration or improvement of an existing product, and towards the creation of a “new product or innovation”. He pointed out that problem solving is more useful for the later design task than for the former.

Diagram 4 shows the reasons that underpin the idea that problem solving approach is a fundamental skill for the design of products according to the interviewees’ responses.

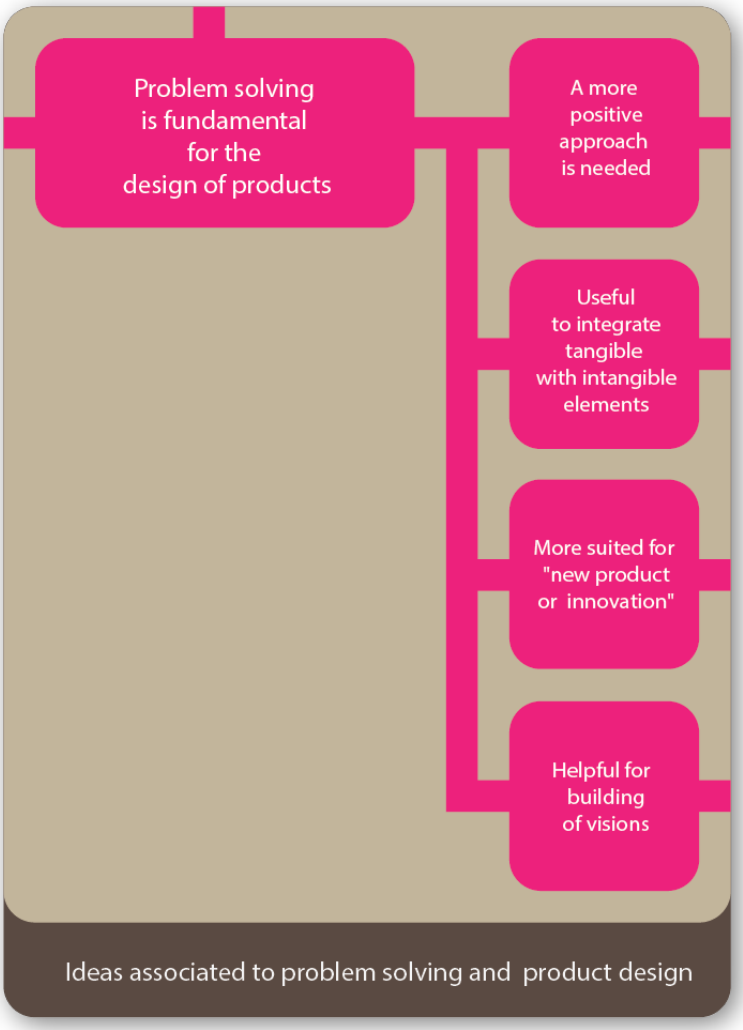

Diagram 4

System thinking is a fundamental skill for the design of services. Do you agree? Elaborate.

The interviewees agreed on the importance of system thinking for designing services. A generalised conception amongst the interviewees is the usefulness of system thinking to deal with complex issues in design services.

For example one of them explains that in dealing with complexity, system thinking can be useful to zoom in into specific processes such as customer journeys, to understand dynamic processes such as service delivery, and to zoom out into wider contextual structures such as government. Other interviewee value system thinking as a tool for grasping complexity, for making multiple thinks to work together and for enable the generation of multiple interrelated concepts. He also believes that system thinking enable the systematisation of pilot services with the purpose of making them grow and work when scaled up.

Another interviewee comments on the perceived quality of system thinking to develop services for social benefit. He claims that in order to do good for society, "system thinking is your basic toolkit". Differently, another interviewee affirm that system thinking helps to understand that the solution is not in an individual artefact, but is in the combination of a network of actors coming together. Diagram 5 illustrates concepts associate with the relevance of system thinking in the design of services according to the interviewees view.

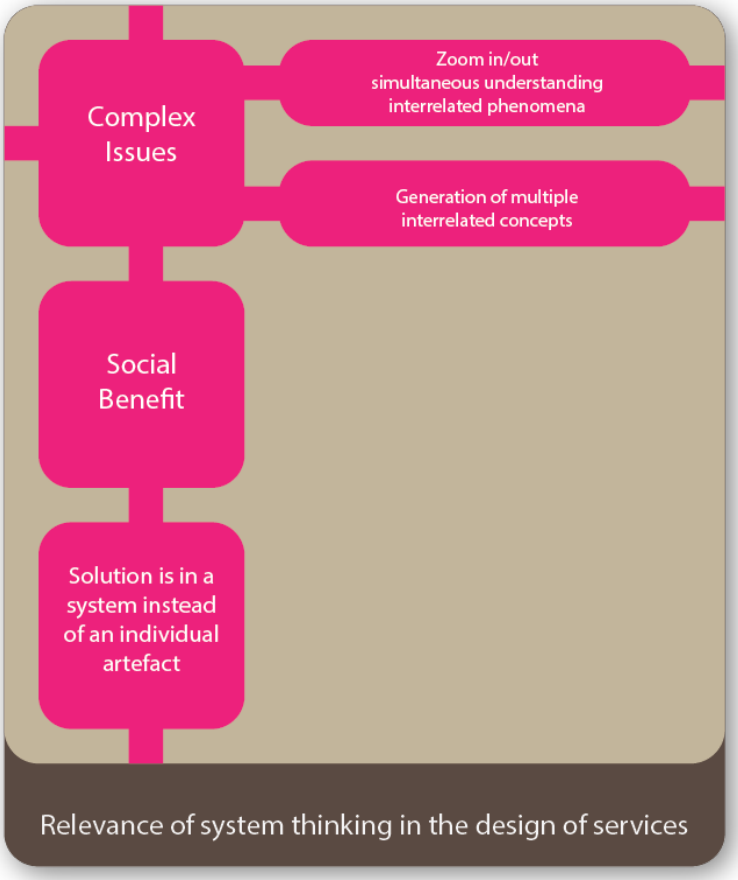

Diagram 5

How problem solving weights in comparison to system thinking, when designing products and when designing services

The interviewees seem to agree on the value of both problem solving and system thinking approaches for both product and services design. However some of them believe that the approaches are more suitable for either product or services design. For example, one of the interviewees explains how problem solving is more appropriate to product design, while system thinking is better for the design of services due to their fuzzy nature and bigger size and complexity. He argues that system thinking helps the designer of services to "orchestrate" multiple variables and stakeholders within a service.

Other interviewees believe that system thinking and problem solving can be integrated to address complex or "wicked" problems in product and service design. Additionally one of them explains that both approaches are necessary and not mutually excluding. Furthermore, system thinking serves to sketch the landscape in which problems are identified and solved: System thinking overarches problem solving.

Another interviewee describes how in services design is possible to use system thinking without need of employing problem solving, for example to understand a network of mutually interacting elements. Yet, he explains, as solving a problem in a network brings repercussions to the whole network, a system thinking approach allow designers to understand these repercussions. He summarises this concept by explaining that service design is solving a problem (using problem thinking) in the context of systems (understood using system thinking).

Table 7 summarises when problem solving and/or system thinking is appropriated in product and service design according to the interviewees. Six different factors determine the level of appropriateness of each approach, and help to define the weight of each approach in product design and service design. It is noticeable that in regards to two of these factors "integration" and "function of approach" both approaches, problem solving and system thinking, have similar "weight".

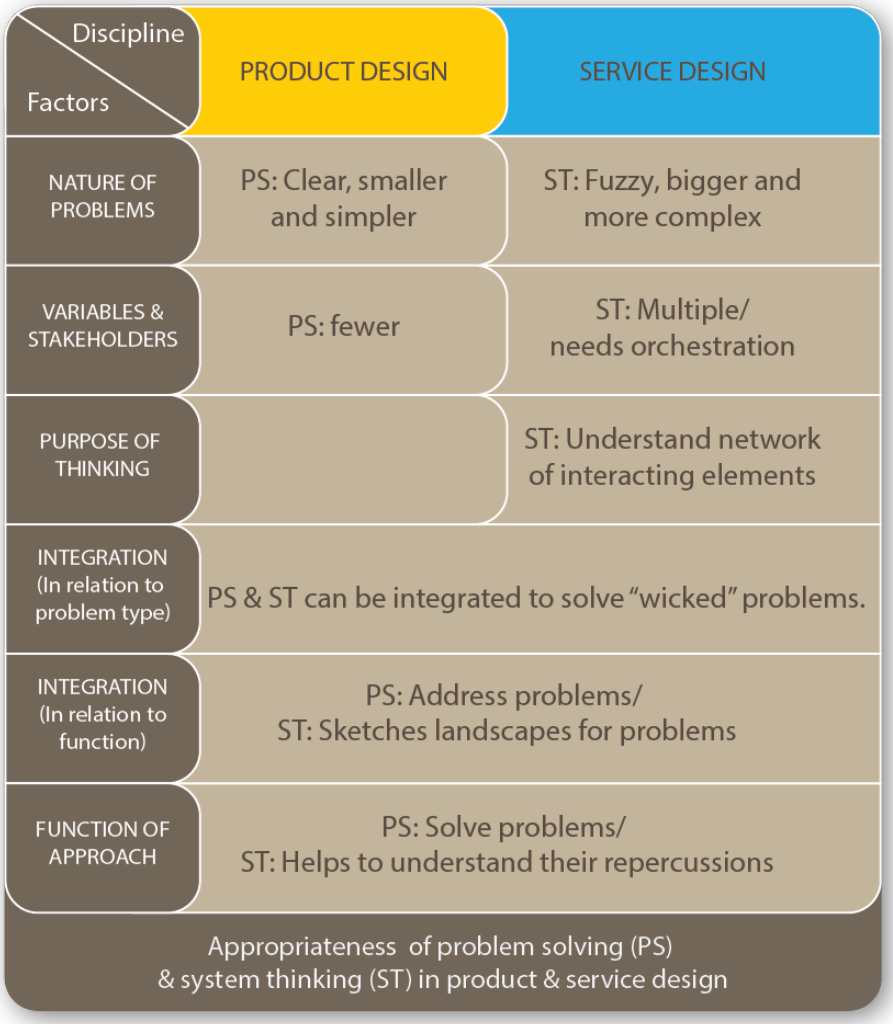

Table 7

DISCUSSION

Based on the findings from the interviews, it is apparent that the shift form problem solving thinking to system thinking as a consequence of a shift from product to services design is not as simple as the literature review suggests, and systems thinking appear to be only one of the aspects of this change in design thinking. To develop this idea, each of the finding themes will be discussed.

Theme 1 Product vs. services

It seems that differences between products and services are related to their dynamicity, scope width and tangibility. However product and services seems to be integrate-able, as products can be accompanied by or be part of services, and contingent, as both are not mutually necessary for each other existence.

Designing services is regarded as a more complex activity than designing products. The design

process nature changes for services as its end becomes fuzzy and entangled with the implementation and running of the service.

If there are any identifiable factors related to the difference between products and services and their design processes, that indicate a shifting in design thinking, it must be the dynamic and intangible nature of services, as well as its higher complexity. These differences might be an indication that a new type of thinking is required by product designers for the design of services.

Theme 2 Design of Services

It is apparent that product designers have been able to move into the design of services thanks mainly to the transferability of their skills, and that this process has been also stimulated by government and social drive.

System thinking is recognised as an important skill, but others such as research skills, collaborative skills, etc. are considered important too. It might be the case that the thinking shift in service design is not necessarily towards the paradigm of system thinking, but to another more complex and yet to be identified.

Theme 3 Shift from products to services

Amongst main factors influencing the shift to product to services design are the increasing development of technology, the emergence of new business models, government agendas on the development of services, and changes on people's mainstream thinking and values.

As designers move from product design to services design, there are perceived changes in the scope of their profession, especially in regards to the increasing involvement of users in the design process, and the focus on user behavioural change and innovation in business models and public services.

This possibly suggests that important changes in designers' thinking related to their ability to understand complex areas such as business and public services are needed. However, as important as the adoption of system thinking might appear for the satisfaction of this need, other types of thinking such as business thinking and customer service thinking might be as important as system thinking.

Theme 4 Problem solving approach and system thinking

It is apparent that design thinking changes noticeably from product design to service design. But

regardless of this, the preoccupation for the user remains as a key element of thought in both cases. It seems that system thinking is not regarded as a very important feature for product design, but it is for service design, especially because of its usefulness to deal with complexity, as suggested in the literature. In contrast, problem solving is perceived equally useful for the design of both products and services (Although it has been suggested that problem solving sometimes is counterproductive in service design).

This may imply that rather than a shift from problem solving thinking to system thinking, the transition from product to service design has produced an “addition”, bringing system thinking to the design of services. Actually, in service design, problem solving and system thinking are not opposite, competing or mutually excluding ways of thinking, but complementary.

This research suggests that the need of problem solving and system thinking approaches in design activity is not determined by the desired design output (products and/or services). Instead, it seems to be individually dictated by the singular and individual design process adopted by individual designers in each project undertaken. Their likelihood to be employed mostly depends on how general (holistic) or specific is the view that the designer(s) wish to have at the moment of application, as well as if the purpose for adopting either approach is more geared towards understanding or resolution.

CONCLUSIONS

This paper has presented the results of a research examining how design activity has changed for product designers that have become service designers. In particular, it has explored the adoption of system thinking as an approach to the design of services, in relation to the problem solving approach commonly utilised by product designers.

First it has examined relevant literature explaining how the problem solving approach has become insufficient to deal with the fuzzy nature of the issues designers face nowadays. It has also explored how product designers has shifted into service design, and explained why the system thinking approach can be useful to deal with the complex nature of services, and how it has been adopted by service designers.

Second, it has presented the results of a series of semi-structured interviews made to designers working on design consultancies and education that have moved from product design towards services design. It reported the interviewees' views about differences and commonalities between product design and service design, on their experiences while shifting from product to service design, and on their design approach in relation to the problem solving and system thinking approaches.

The literature review and the interviews results have been compared showing that a change in the way designers think and approach projects has taken place, demonstrating that the design of products requires a different design approach to the design of services, and that there is a strong link between system thinking and the design of services.

The weight of the evidence seems to indicate that a movement from problem solving to system thinking takes place when designers are faced with the challenges of designing a service. However it seems that the system thinking approach does not necessarily replace the problem solving approach but it complements it. The results also indicate that the growing complexity of the issues designers deals with have an influence on the adoption of system thinking to respond to service design challenges. It also shows that current changes in people's mind about sustainability, society, etc. have also an impact on this.

This paper does not claim generalisation and can be taken only as an initial exploration on the subject. Further study would be needed to establish how exactly the system thinking approach is

utilised in the design of services, and to examine how it compares to other alternative design approaches employed in services design.

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